# Enhanced Vapor Recovery Amendments Workshop

June 18, 2002

Air Resources Board

California Environmental Protection Agency

# Agenda

- Introductions
- EVR Tech Review and EVR Amendments
- Discussion of Comments Received
- Proposed EVR Amendments
- In-Station Diagnostics
- Cost-Effective Analysis Update
- Schedule

# Tech Review Direction from March 2000 Resolution

- Feasibility of standards with future effective or operative dates
- Comprehensive, thorough and rigorous
- Evaluate practical alternatives
- Hold workshops
- Complete tech review by April 1, 2002
- Submit final report to Board for consideration at a public meeting

# EVR Amendments

- Propose changes to EVR regulation based on tech review findings
- Improve certification process for Phase II and ISD combinations
- Define “rigid” vapor piping
- Revised and new test procedures
- General clean-up and clarification

# Comments Received

## Tech Review

- EVR alternatives
- Phase II standards
- Nozzle standards
- ISD
- Cost Analysis

## Other EVR

- EVR implementation schedule
- Certification process
- Sole source
- In-use VR systems
- ISD Enforceability

# EVR Implementation Schedule

Concerns:

- One certified Phase I system
- No certified Phase II systems
- No certified ISD systems

Response

- will not lower bar just to certify multiple systems

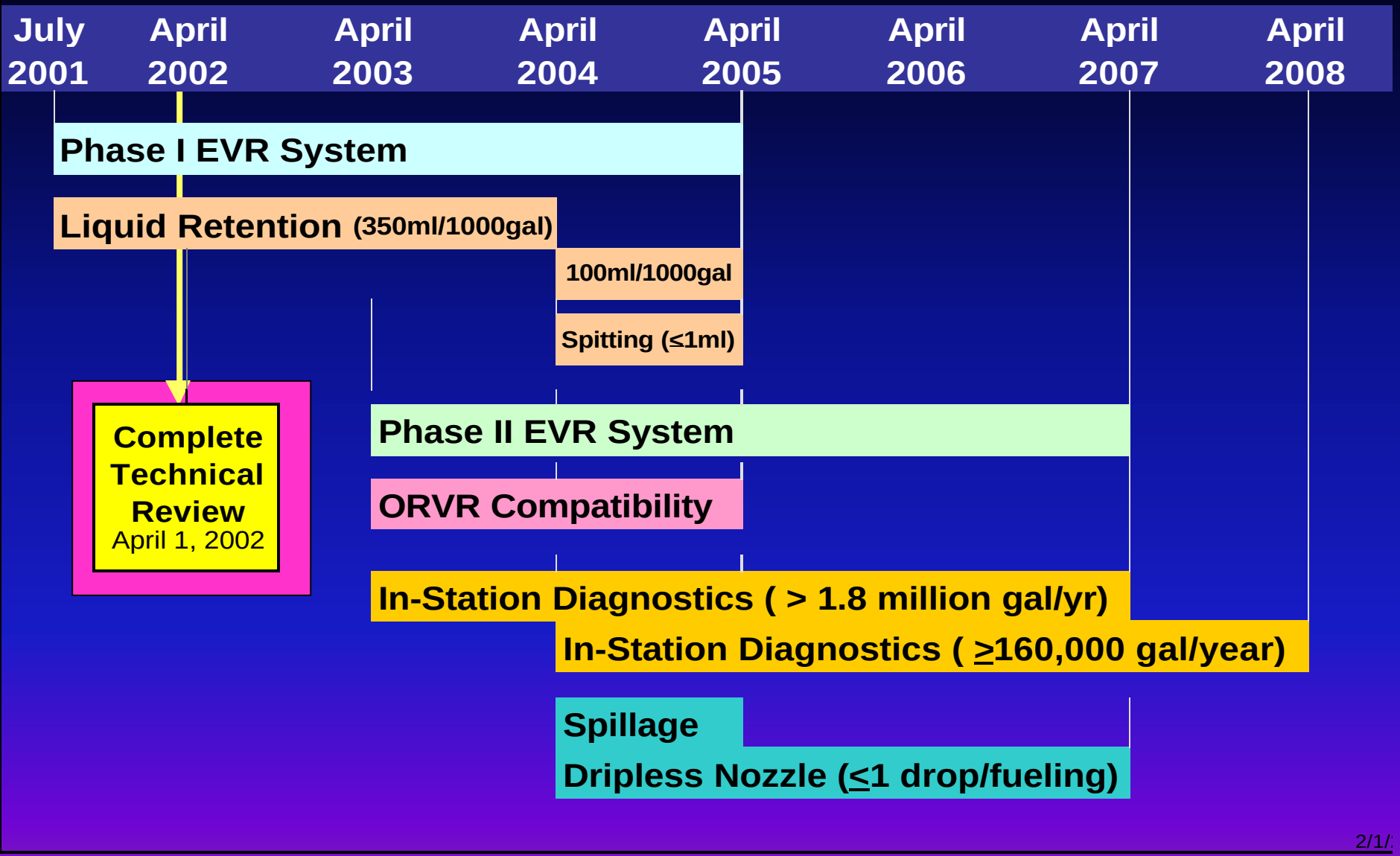
# Phase I EVR Status

- 17 system applications
- 14 test sites sealed
- 9 systems failed
- 3 systems currently on test
- 1 system withdrawn
- 1 system certified

# Phase II EVR Status

- 2 system applications
- 0 test sites sealed
- 0 systems currently on test

# The Enhanced Vapor Recovery Timeline



# Phase II and ORVR

Comment:

- Extend ORVR compliance date to April 2007 to align with Phase II

Response:

- Excess emissions of 3.4 tons/day in 2005 would not be controlled. No delay in ORVR requirements.

# EVR for Attainment Areas

Comment:

- Request delayed implementation for districts in attainment areas

Response:

- EVR needed to minimize benzene exposure

# Certification Process: Encourage R&D

Comment:

- Expedite/simplify application process for research projects

Response:

- Have approved 12 R&D sites over 18 months, usually within weeks of request

# Certification Process: Provide Funding

Comment:

- Provide grants for development where industry options are limited

Response:

- ARB Innovative Clean Air Technology (ICAT) grants are available

# Certification Process: Test Stations

Comment:

- Require a minimum of 300,000 or 400,000 gal/month

Response:

- Hard to get test sites now at 150,000 gal/month. No change.
- Evaluate performance for higher throughputs

# Certification Process: Test Stations

Comment:

- Expand or eliminate 100-mile radius from Sacramento

Response:

- Need sites close to Sacto certification staff. Will consider exceptions for good cause.

# Certification Process: Nozzles

Comment:

- Certify nozzles separately to meet spillage and drip standards

Response:

- Nozzles are system-specific component and cannot be separated from Phase II system

# Certification Process: Processors

Comment:

- Certify processors by system type

Response:

- We are considering this change

# Sole Source for EVR Systems

Comment:

- One option leads to higher cost and inadequate supply

Response:

- Additional systems should be available before EVR deadlines for existing stations. Unfair to penalize system that meets requirements.

# In-use VR Systems

Comment:

- Address deficiencies in balance systems. Develop test procedures for in-use components

Response:

- EVR balance systems will address deficiencies. Suggest districts take lead in developing inspection test methods.

# Tech Review Comments

- EVR alternatives
- Phase II standards
- Nozzle standards

- ISD
- Cost Analysis

- EVR implementation schedule
- Certification process
- Sole source
- In-use VR systems

- ISD Enforceability

# EVR Alternatives

Comment:

- Report does not provide thorough and rigorous review of alternatives

Response:

- Staff evaluated all alternatives identified by stakeholders. No alternatives sought for standards characterized as feasible

# Phase II standards

- Maximum A/L ratio
- Pressure-related fugitives
- Balance component pressure drops
- Nozzle/dispenser compatibility
- Processors

# Maximum A/L ratio

Comment:

- Max A/L should be based on system specific failure mode risk.

Response:

- Allowable A/L ranges established during certification. Max A/L limits ensure excess emissions do not exceed EVR system limits in the event of system failure.

# Pressure-related fugitives

Comments:

- Standardize to allowable leak rate.
- Don’t combine allowable leak with actual operating test pressures

Response:

- Considering introducing a controlled largest allowable leak during a portion of the operational test

# Balance component pressure drops

Comment:

- Include allowance for ISD flow sensor by increasing total allowable pressure drop

Response:

- No increase in total pressure drop
- Use balance components that meet lower than max for systems with ISD flow sensors

# Nozzle/dispenser Compatibility

Comment:

- How will compatibility be determined for grandfathered six-pack dispensers?

Response:

- Will provide guidance on compatible EVR nozzles for existing dispensers

# Processors

Comment:

- Not true that complete redesign of processor systems necessary to meet EVR

Response:

- Will modify report to reflect manufacturer claim that existing system meets max A/L and processor flowrate limits

# Nozzle standards: Post-Fueling Drips

Comment:

- Manufacturer claims can meet 3 drop average

Response:

- Propose 3 drop average over total station (10 runs/nozzle) with maximum of 10 drops for any one fueling. Verify 3 drops feasibility by Sept. 2002

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# Proposed EVR Amendments

- “Dripless” nozzle standard
- CP-201 revisions
- Test procedure changes
- Certification of ISD by system type
- ISD-based maintenance during certification testing

# “Dripless” nozzle standard

- Currently “1 drop per refueling”
- Only EVR standard determined not to be feasible in tech review
- 3 drop average with 10 drop max is proposed

# CP-201 revisions

- Processor HC rate
- Efficiency for ORVR fuelings
- Vapor piping definitions
- Hand pump specifications
- Certification process changes

# Processor HC rate

Propose:

"maximum hydrocarbon feedrate from ~~to~~ the processor shall not exceed 5.7 lbs/1000 gallons"

# Efficiency for ORVR fuelings

- Efficiency calculation not valid for ORVR fueling
- Modify CP-201 to calculate efficiency for non-ORVR vehicles only

# Vapor piping definitions

- Need definition for “rigid” pipe
- Options
  - minimum bend radius
  - bulk modulus
  - pipe deflection test procedure

# Hand pump specifications

- Evaluate hand pumps to be used in place of spill container drain valves
- Certify that hand-pumps are durable and remove liquid as well as drain valve

# Dispenser standard

- Dispenser vapor piping for balance systems already designated as a non-system specific component
- Propose to remove “balance” to allow all dispenser vapor piping to be non-system specific

# Daily high pressure

- Clarify calculation in CP-201
- Intent:
  - Calculate the average pressure reading for each hour.
  - Identify the highest one-hour pressure average over a 24 hour period. This is the daily high pressure.
  - Compute rolling 30-day average of daily high pressures - may not exceed +1.5 inches water.

# Certification process changes

- innovative system
- throughput for sixpack dispenser
- Phase I systems

- certify ISD by system type
- ISD-based maintenance

# Innovative system

- Intent was to allow flexibility for systems which emit much less than allowed by current standards
- In practice - viewed as way to avoid compliance with some EVR requirements
- Language to be modified to better reflect intent

# Test site throughput for sixpack dispensers

- Unihose: Minimum throughput of 150,000 gal/month
- Six-pack: Minimum throughput of 150,000 gal/month for one grade of gasoline

# Phase I systems

- Operational test of < 180 days for new Phase I systems composed entirely of previously certified Phase I components to be considered

# Test procedure changes

| | |
|---|---|
| TP-201.1 | Phase I Efficiency |
| TP-201.2B | Component Leakrates |
| TP-201.2D | Post-Fueling Drips |
| TP-201.2F | Pressure-related Fugitives |

# Proposed test procedures

| | |
|---|---|
| TP-201.2? | Balance components pressure drops |
| TP-201.1? | Continuous pressure monitoring |
| TP-201.2? | ISD certification |

# TP-201.1
# Phase I Efficiency

- Current procedure assumes volume of vapor returned to cargo tank is same as volume of gallons dispensed
- Revised procedure measure vapor volume directly using meter to improve accuracy

# TP-201.2B Component leakrates

- Current procedure for P/V valve leak measurement uses rotameters
- Revised procedure allows option for mass flow controller to improve accuracy

# TP-201.2D
# Dripless nozzle

- Modifications suggested to improve method consistency
- 15 drops/ml to be changed to

  20 drops/ml to be consistent with spillage procedure

# TP-201.2F Pressure-related fugitives

- Current procedure has missing equations
- Change time for pressure decay from 20 minutes to 5 minutes

# Balance component pressure drop

- New procedure
- Bench test to determine pressure drop for balance components

# Continuous pressure monitoring

- New procedure
- Describes equipment and procedure for pressure monitoring required for certification operational tests

# ISD Performance

- Describes certification tests to determine compliance with ISD standards

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# Certification Process: ISD

Comment:

- Certify ISD by system type

Response:

- ISD system type certification will be proposed in the EVR amendments

# ISD Enforceability

Comment:

- ISD A/L failures should be equivalent to Executive Order requirements

Response:

- ISD is a diagnostic tool to correct gross failures - it is not a Continuous Emission Monitor!

# ISD Enforceability

Comment:

- Lack of corrective action is a violation
- Tamper-proof ISD systems
- Require shut-down for gross failures

Response:

- Agree

# ISD Compatibility

Comment:

- ISD systems must be compatible with existing UST tank monitors

Response:

- Use stand-alone ISD systems where there are compatibility issues. Costs are reflected in economic analysis.

# In-Station Diagnostics

Comment:

- A less elaborate ISD system could meet goals and cost less

Response:

- Less elaborate ISD systems reviewed did not achieve same emission reductions

# In-Station Diagnostics

Comment:

- ISD is a non-invasive, passive system. Only one certification is necessary for any type system

Response:

- ISD systems may not be completely independent of Phase II.
- Proposing certification by “system-type”

# In-Station Diagnostics

Comment:

- ORVR penetrations >80% may affect performance of ISD systems

Response:

- ISD systems will be evaluated at high ORVR penetration during certification testing

# In-Station Diagnostics

Comment:

- ISD pressure integrity standard too vague

Response:

- Will remove reference to orifice and leave the 2X allowable leak requirement

# In-Station Diagnostics

Comment:

- Request for ISD pilot study data

Response:

- Data can be made available

# Certification of ISD by system type

- Three certification options considered:
  - ISD certify once with one Phase II system
  - ISD certify with every Phase II system
  - ISD certify with each Phase II system type

# Proposed ISD System Types

- Balance
- Balance with Processor
- Vacuum assist (dispenser-based)
- Vacuum assist (dispenser-based with processor)
- Central vacuum
- Central vacuum with processor

# ISD-based maintenance during certification testing

- ISD benefit is immediate identification of system failures
- Recognize that ISD will make it harder for Phase II systems to pass operational test
- Provide limited repair of failures identified by ISD during certification

# ISD-Maintenance Criteria

- No failure for 90 days
- ISD-detected failures identified in maintenance manual
- Maximum 5% of allowable downtime for to ISD-detected failures
- Manual field test failures are grounds for test termination

# If ISD-Detected Failure Occurs

- System certification will require use of ISD system
- Executive Order is non-renewable thus complete certification tests would be required after 4 years

# If No ISD-Detected Failures

- System may be certified for use both with and without ISD
- Certification may renewed after four years with no additional certification testing unless deficiencies are identified

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# Cost Methodology

- Comments received
- Updates to cost analysis since tech review report
- Current cost-effectiveness

# Cost Changes based on Comments

- ISD installation costs depend on station size
- ISD maintenance/calibration/repair costs vary by station size
- Include annual field test costs for balance systems

# ISD installation costs

- EVR ISOR - $1280 per dispener
- Tech Review - $2560 per dispenser
- Update based on pilot site experience for retrofit installation:
  - Base install for each site = $300
  - Unit cost for each dispenser = $200

# GDF Model Stations

| Group | GDF 1 | GDF 2 | GDF 3 | GDF 4 | GDF 5 |
|---|---|---|---|---|---|
| Typical throughput gal/mo | 13,233 | 37,500 | 75,000 | 150,000 | 300,000 |
| Throughput range gal/mo | Up to 25,000 | 25,001–50,000 | 50,001–100,000 | 100,001–200,000 | 200,001 and up |
| % throughput | 0.6 | 5.3 | 34.3 | 47.1 | 12.7 |
| % stations | 4.7 | 14.1 | 45.7 | 31.3 | 4.2 |
| Number of dispensers | 1 | 1.5 | 3 | 4.5 | 6 |

# ISD Installation Costs

| | GDF 1 | GDF 2 | GDF 3 | GDF 4 | GDF 5 |
|---|---|---|---|---|---|
| EVR ISOR | $1,230 | $1,230 | $1,230 | $1,230 | $1,230 |
| Tech Review | $2,560 | $2,560 | $2,560 | $2,560 | $2,560 |
| **ISD Pilot** | **$500** | **$600** | **$900** | **$1,200** | **$1,500** |

# ISD maintenance/calibration/repair costs per facility

- EVR ISOR - not included
- Tech Review - $1200/yr
- Update based on # components with vendor estimated costs:
  - A/L sensor = $300
  - Pressure sensor = $200
  - Datalogger = $50
  - Contractor training/certification = $20

# ISD maintenance/calibration/repair costs per facility

| | GDF 1 | GDF 2 | GDF 3 | GDF 4 | GDF 5 |
|---|---|---|---|---|---|
| EVR ISOR | Not included | Not included | Not included | Not included | Not included |
| Tech Review | $1,200 | $1,200 | $1,200 | $1,200 | $1,200 |
| **Veeder-Root** | **$520** | **$720** | **$1,170** | **$1,620** | **$2,070** |

# Include annual field test costs for balance systems

- Existing balance system Executive Orders require testing every 5 years
- EVR systems will require annual testing
- Need to add costs associated with balance system increased testing
- Will do after review of district requirements for balance systems

# Other Cost Analysis Updates

- Corrected annual equipment cost for cost-effectiveness calculation
- Reduced projected number of certified EVR systems
- Increased “worst case” ISD system cost
- Revised ISD emission reductions

# Corrected Cost-effectiveness Factor

- Error in February 2000 cost analysis in spreading cost over 4-year period
- Increases equipment costs in summary table by a factor of 3.5
- Total annual equipment costs in GDF tables do not change

# Reduced projected number of EVR systems

| | EVR ISOR | Tech Review | Revised Projection |
|---|---|---|---|
| Phase I | 14 | 14 | 7 |
| Phase II | 64 | 64 | 32 |
| ISD | 16 | 16 | 8 |

# ISD "Worst Case" Equipment Cost Update

| | tech rev | now |
|---|---|---|
| TLS-350ISD | $4,500 | $3,995 |
| Dispenser Interface | | $670 |
| Pressure sensor | $750 | $595 |
| Flow sensor | $900 | $885 |
| Inventory sensor | not incl | $1,095 |

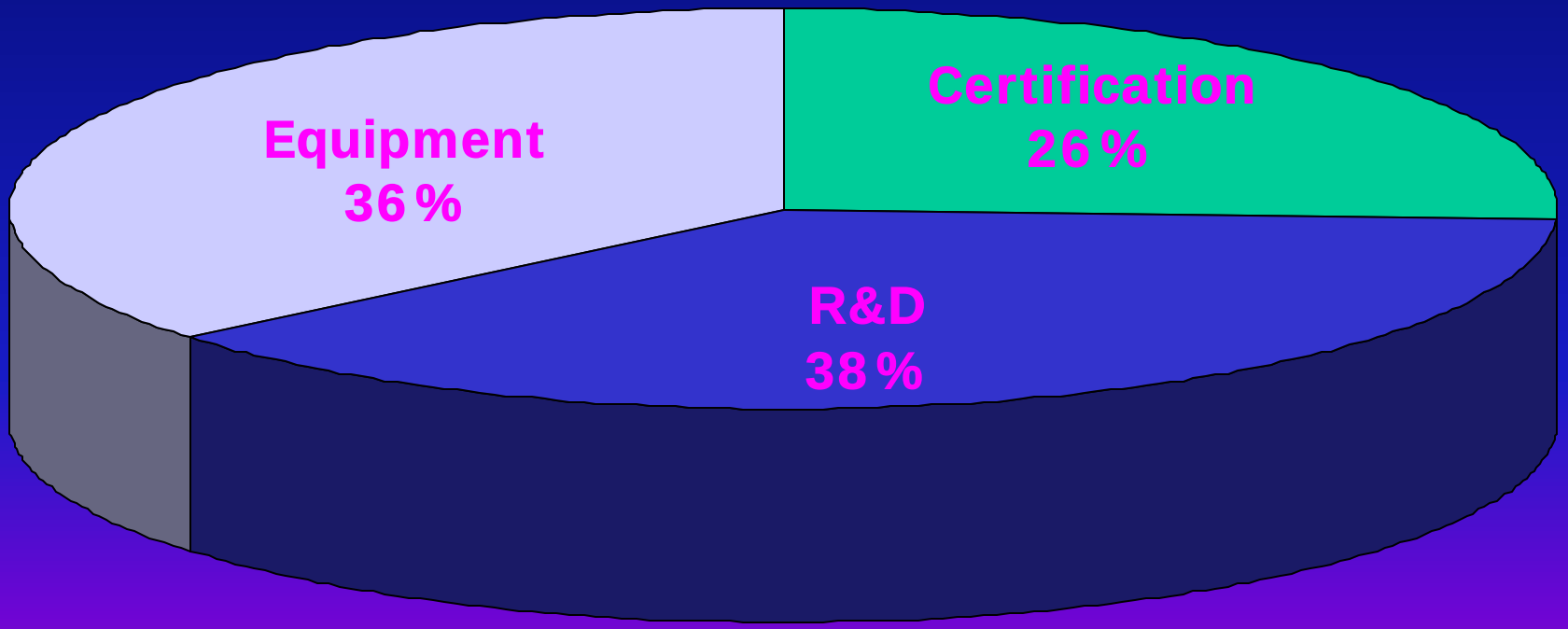
# ISD Equipment Only Cost Comparison

| | GDF1 | GDF2 | GDF3 | GDF4 | GDF5 |
|---|---|---|---|---|---|
| Tech Rev | $6,150 | $6,600 | $7,950 | $9,300 | $10,650 |
| Update | $8,883 | $9,625 | $10,656 | $11,980 | $13,308 |

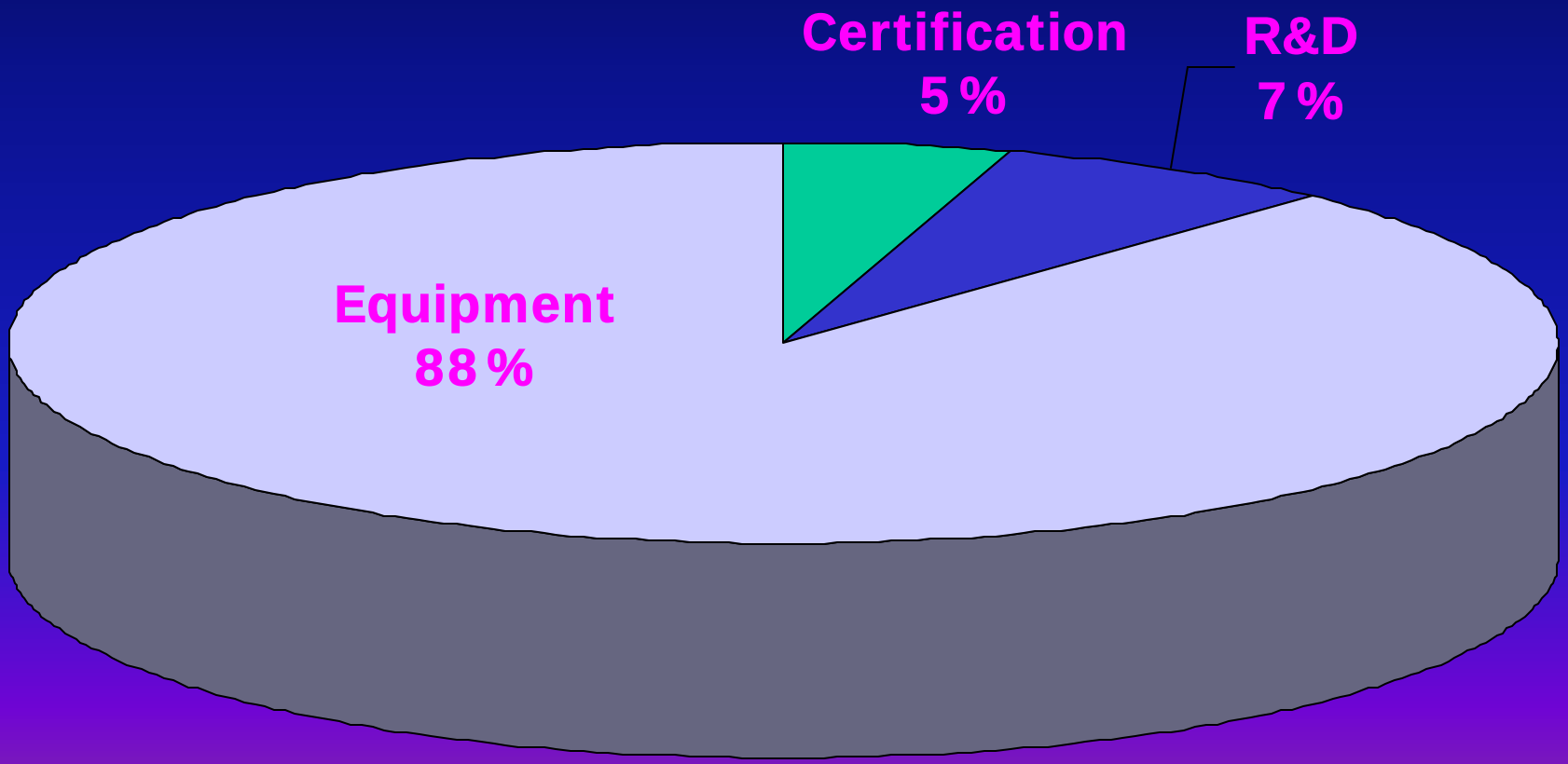
# Revised ISD emission reductions

- Revisions described in EVR Technology review report but were not applied in cost analysis
- ISD emission reductions increase from 6.6 to 8.5 tons/day of 2010 ROG

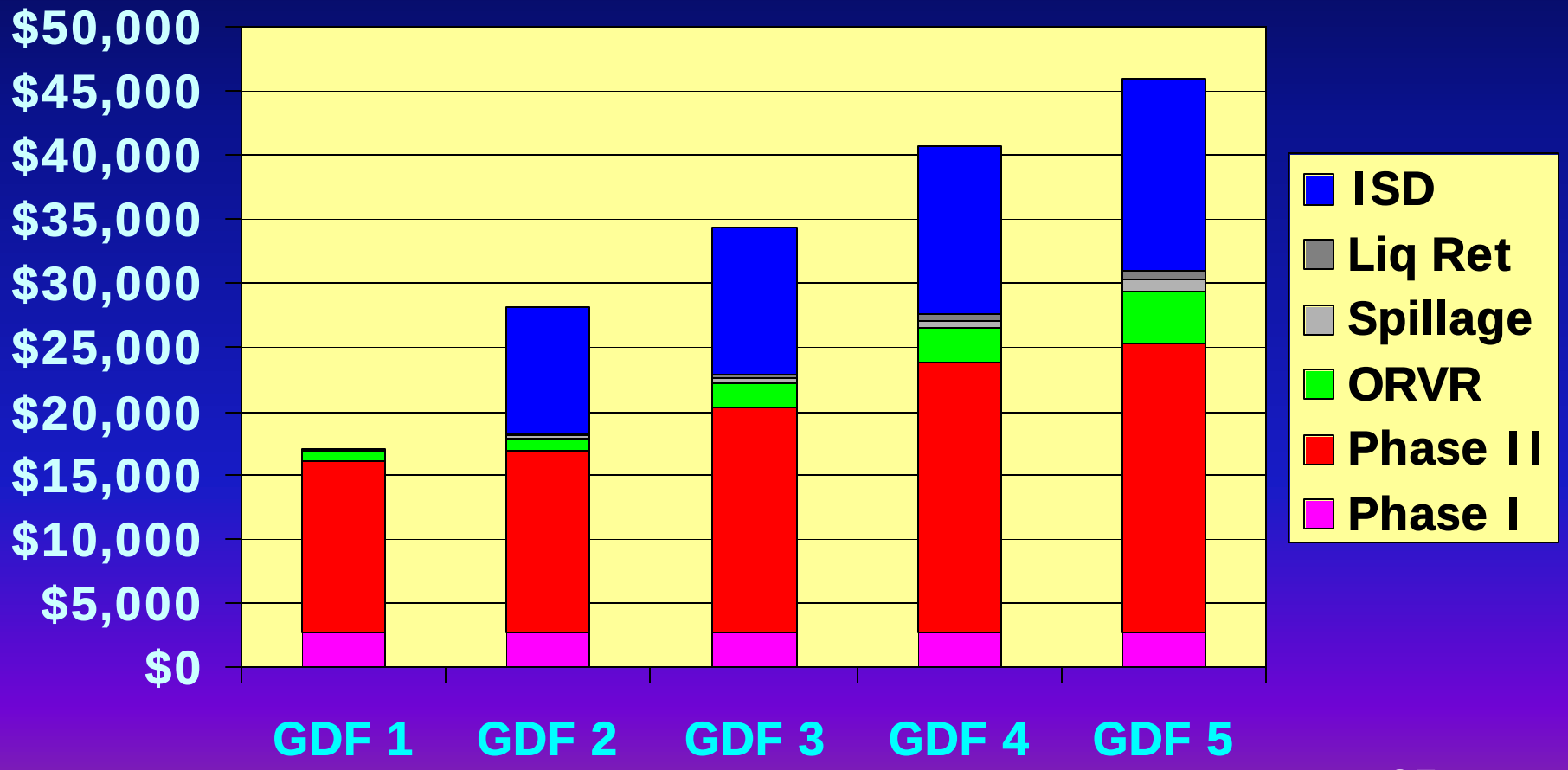
# Feb 2000 EVR Costs 33 million annually



# June 2002 EVR Costs 88 million annually



# EVR Total Equipment and Installation Costs



# Overall Cost-Effectiveness as of June 2002

$$\left(\frac{\$88{,}000{,}000/\text{yr}}{27 \text{ tons/day}}\right)\left(\frac{1 \text{ ton}}{2000 \text{ lb}}\right)\left(\frac{1 \text{ yr}}{365 \text{ days}}\right)$$

$$= \$4.46/\text{lb}$$

# EVR Cost Effectiveness as of June 2002

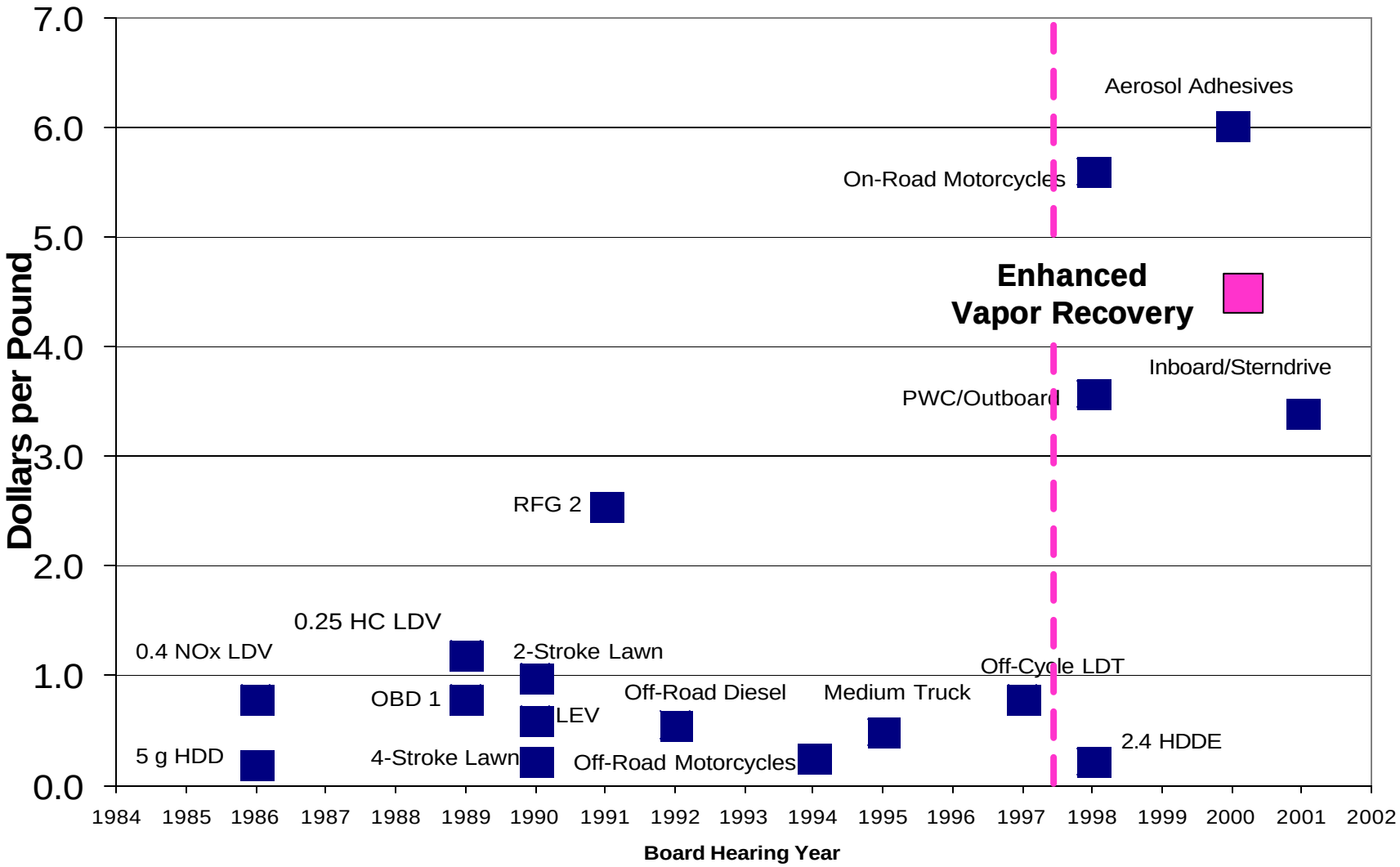
| Group | GDF 1 | GDF 2 | GDF 3 | GDF 4 | GDF 5 |
|---|---|---|---|---|---|
| gal/mo | 13,233 | 37,500 | 75,000 | 150,000 | 300,000 |
| % | 4.7 | 14.1 | 45.7 | 31.3 | 4.2 |
| EVR em red (tpd) | 0.17 | 1.43 | 9.27 | 12.71 | 3.43 |
| C.E.* ($/lb) | ~~$24.22~~ $15.37 | $9.10 | $5.74 | $3.40 | $1.95 |

*Overall Cost-Effectiveness = $4.46/lb

# EVR Cost Effectiveness Development ($/lb)

| | GDF 1 | GDF 2 | GDF 3 | GDF 4 | GDF 5 |
|---|---|---|---|---|---|
| ISOR Feb 2000 | $12.49 | $4.42 | $2.41 | $1.24 | $0.63 |
| Tech Rev Apr 2002 | ~~$15.25~~ $10.11 | $5.46 | $3.04 | $1.61 | $0.81 |
| Workshop Jun 2002 | ~~$24.22~~ $15.37 | $9.10 | $5.74 | $3.40 | $1.95 |
| Bd Mtg Sept 2002 | ?? | ?? | ?? | ?? | ?? |

# Cost Effectiveness of Major Regulations
# Mobile Sources and Fuel



# Schedule for EVR Regulation Amendments

- Comments by July 5, 2002
- Notice and ISOR release on

  August 9, 2002

  (start of 45-day comment period)
- September 26, 2002 Board meeting

# EVR Contacts

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**www.arb.ca.gov/vapor/vapor.htm**